

## IRTS POINTING RECONSTRUCTION AT IPAC

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The star sensor in the IRTS focal plane has the capability of easily detecting stars as faint as  $J(1.25\mu\text{m}) \sim 6$  mag in unconfused regions of the sky. A point source extractor for the STS data was developed to provide time tag, cross-scan location, magnitude and a closeness of fit measure for candidate point sources, as well as uncertainty measures for positions and magnitudes.

For pointing reconstruction purposes an astrometric catalog in J was created. The IRAS Faint Source Survey Optical Identification database and the PPM catalog were used to generate an accurate astrometric catalog of predicted J band magnitudes with approximately half a million entries (JCAT), going down to  $J \sim 10$  mag.

In the post-flip period when IRTS was observing mostly the high  $|b|$  sky, the star sensor data were sensor noise limited down to  $-6$  mag. For each orbit, the nominal pointing of the spacecraft was used as an initial estimate to place the extractions on the sky. An iterative method was used to find the actual counterparts of the extractions in JCAT. After identifying a sufficient number of stars per orbit, typically  $\sim 120$  per orbit, these identified astrometric sources were used to reconstruct the actual path of the spacecraft for the given orbit,

For the pre-flip period, when IRTS was operating at low  $|b|$ , source confusion prevented the method of high  $|b|$  sky from being used. A method was developed to identify the sources observed repeatedly, directly from the star sensor data. These repeating sources were then identified in JCAT and then each orbit was reconstructed accordingly, using typically  $\sim 50$  astrometric sources per orbit,

In the post-flip period, approximately 50,000 STS point source detections were obtained at  $S/N > 5$ . These point source detections resulted in sightings of over 28,000 JCAT sources, which were then used for pointing reconstruction. After removing small limit cycle oscillations of the spacecraft, the pointing accuracy along the scan direction is  $\sim 40''$  in the direction perpendicular to the scan direction the pointing accuracy is under  $\sim 1'$ .

During a shorter duration pre-flip period, over 20,000 STS detections were obtained at a  $S/N > 5$ ; these resulted in sightings of over 3,600 JCAT sources which were used for pointing reconstruction. The resulting reconstructions produce pointing accuracies of better than  $\sim 1-2'$  in the direction parallel to the scan direction, in the direction perpendicular to the scan direction the pointing accuracy is  $\sim 1-2'$ .